CHAPTER III

WATERSHED MANAGEMENT PLAN FRAMEWORK

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CHAPTER III: WATERSHED MANAGEMENT PLAN FRAMEWORK

The core of the watershed planning effort is reflected in this chapter of the Watershed Plan. The Plan Framework presented in this chapter serves as a bridge between the existing conditions detailed in Chapter III and the projects and programs described in Chapter IV the watershed implementation plan.

Information collected throughout the planning process has been developed, refined, and organized into this Plan Framework. The result is an easy to use reference for assessing how the projects described in the Implementation Plan can support the Vision, Goals, and Strategies presented here.

Four elements comprise the Watershed Management Plan Framework:

A. Purpose of this Watershed Management Plan
B. Vision for a Healthy Rio Hondo Watershed
C. Goals necessary to articulate the vision
D. Strategies and potential actions needed to achieve the Goals for a healthy watershed

A. Purpose of the Watershed Management Plan

The purpose of the Rio Hondo Watershed Management Plan is to provide an organizing framework for municipalities, conservation organizations, and individuals alike to work together to improve the water quality, health, habitat, and recreation potential of the Rio Hondo Watershed. This Watershed Management Plan identifies goals and strategies necessary to manage the overall watershed as a healthy, life giving natural system. This plan also outlines steps to facilitate the establishment of a watershed consortium, in which communication of information, identification of priorities, funding development, creation of new projects, and ultimately implementation of watershed improvements can occur.

B. Vision for a Healthy Rio Hondo Watershed

The vision statement below describes the Rio Hondo Watershed as it is envisioned by this plan, sometime in the future. How far into the future is not yet clear. Projects and planning can start today, and continue for some time into the future. Continuous improvement within the watershed can be achieved by establishing a watershed oversight committee or consortium, by establishing good baseline information and monitoring programs, and utilizing adaptive management techniques. Over time, a collaborative watershed-wide approach will protect the water, open space and habitat and will come to make substantial positive changes within the watershed.

Future Vision of the Rio Hondo Watershed

The Rio Hondo is a vital, healthy watershed where water managers balance the needs of sustaining a healthy ecosystem within the context of providing water and flood control for an urban environment. The banks of the Rio Hondo and its tributaries provide a visually appealing, green environment offering visitors new trails, parks, and open space reconnecting the river to the economic and social fabric of the communities through which it flows. The newly restored natural landscape is visible in schoolyards and in public open spaces. Single family residences have planted native plants in their backyards, creating a mosaic of habitat across the watershed. Particularly rich riparian environments along the river also provide a series of supportive environments for native species, including habitat linkages extending from the Angeles National Forest to the bottom of the watershed and southward to the Puente Hills. New parks elsewhere in the watershed serve as detention areas during storm events, maximizing groundwater recharge, while providing additional habitat sanctuaries throughout the year.

Where possible, historic streams and their associated floodplains have been restored through the innovative use of alternative stormwater management techniques while essential flood control systems remain in place to ensure public safety and property protection. To accommodate both habitat and human populations, cities in the watershed have developed sustainable planning and building practices and have codified Best Management Practices and using their own activities as examples of stewardship. Throughout the urban environment are signs of the previously hidden hydrologic system as many miles of hidden stormdrains have been daylighted and water flows along inventive surface streams. The daylighted stormdrain system is able to "breathe" and is more porous once again after systematic removal of many acres of concrete, and asphalt.. Imported water needs have been reduced by 10%, saving the region tens of millions of dollars a year. Most parking lots in the watershed have the ability to capture all of its runoff, filter and percolate it into the ground.

The Rio Hondo River will be more visible in the community where there will be increased awareness of the vital role that it and the entire watershed play in supporting an improved quality of life while maintaining a quality local water supply. There is a strong desire among residents to protect the watershed and to.participate in water conservation and improvement programs. There is a sense of stewardship and trust among the cities, public agencies, and conservation organizations charged with the responsibility of deploying science-based, cost effective strategies to improve water quality, habitat and recreation opportunities in the Rio Hondo watershed. This collaborative approach enabled inter-jurisdictional programs that mirror the interdependent communities within the watershed.

C. Goals to Articulate the Vision

Six goals have been identified to further develop and articulate the Rio Hondo Watershed Vision, and a seventh goal was added to encourage achievement of multiple goals in any particular project. Together, they reflect the ideal that a healthy watershed is one that is able to successfully integrate and balance multiple community needs and interests. Although the goal statements do not specify how each goal is to be achieved, strategies and objectives do, and the need to balance all uses rather than focus on each separately, will insure a broader range of success within the watershed.

1. Improve in-stream water quality to meet or exceed Regional Water Quality Control Board standards and NPDES permitting requirements. Implement a wide array of Stormwater Best Management Practices (BMPs) to optimize local water resources and reduce dependence on imported water while increasing beneficial water uses available to the public.
2. Create, enhance, and protect open space through active acquisition of parcels that serve multiple-purpose uses, including; conservation, improvement of aesthetics, community development and connectivity.
3. Improve habitat quality, quantity and connectivity with watershed management and restoration of stream channels. Combine existing habitat, and creation of new habitat where possible to strengthen habitat migration corridors. Establish habitat areas for use by wild creatures, and other habitat areas with the addition of public access and education as appropriate.
4. Improve recreational opportunities as a function of watershed management. Use interpretative opportunities afforded by recreation to enhance watershed awareness and identity.
5. Ensure that public health and safety are integrated into all aspects of watershed enhancement.
6. Maintain current minimum flood protection levels and develop new flood protection strategies to meet the multiple goals required for watershed improvement.
7. Develop priority projects that address multiple goals simultaneously.

Two additional goals which are incorporated into Chapter 4 discussing Implementation. These goals are mentioned here so the reader will be aware they are considered priorities during implementation. They are:

8. Create an effective institutional framework from which to focus sustained efforts on improvement of the Rio Hondo Watershed by providing oversight, management, and measurement of recovery and restoration within the watershed.
9. Improve the long-term health of the watershed by establishing public awareness and stewardship campaigns that educate the public about their role in improving water quality and the overall health of the watershed.

D. Strategies and Potential Actions Needed To Achieve the Goals for a Healthy Watershed

The Watershed Management Plan that follows examines each of the goals and promotes a series of strategies and potential actions to achieve these goals. Each strategy is numbered for easy reference and is supported with a number of related potential actions.

3.1 WATER QUALITY AND CONSERVATION STRATEGIES

Restoring the hydrologic system as much as possible is the key to improving watershed health. This will require the eventual*, and very well considered*, replacement of sections of the existing stormwater management infrastructure, many of which were designed to accommodate intense peak runoff flows, such as certain sections of channelized streambeds. The current system of channels and storm drains was designed to protect the public from intense peak flows and has simultaneously enabled/protected additional development within the Rio Hondo flood plain. This additional development has created more impervious surfaces, more runoff in the flood channels, and reduced the natural capacity of the soils to recharge the underground aquifers. The establishment of spreading grounds has become an important component in recovering some of that runoff for groundwater recharge, a somewhat centralized fashion. The current system however fails to integrate natural open space in any useful way, and has eliminated much of the natural riparian habitat that once supported diverse animal communities and the region's aesthetic quality. The system as it exists also fails to address the capacity of riparian vegetation to absorb pollutants and improve water quality, or the capacity of certain land uses to accommodate temporary flooding and to slow runoff before entering the stream channels. Stakeholders have identified long-term stormwater management strategies as a way to improve water quality, decrease flood risks, increase groundwater recharge, and improve habitat. This chapter amplifies those ideas and describes additional short-term ways to maintain flood protection while improving management of stormwater runoff.

3.1.1 The Need for Water Conservation and Quality Improvement

In Chapter II, Existing Conditions, it was stated that the essential functions of the Rio Hondo watershed, including groundwater storage and habitat support, were heavily affected by development of flood control systems. The effects of urbanization and flood control projects on the watershed include:

- Impervious surfaces have reduced water percolation into the water table
- Water quality is adversely affected by non-point source pollution, especially storm water runoff, entering the watershed from multiple diverse sources in multiple land use areas.

- The lower two reaches of The Rio Hondo are designated as impaired water bodies on the states 303 (d) list because of trash, copper, lead, zinc, ammonia, pH, and coliform bacteria which requires the establishment of Total Maximum Daily Load (TMDL) standards for each of these pollutants.
- Beneficial uses of the Rio Hondo have been negatively impacted by this polluted runoff.

Because of these findings, a comprehensive approach to improving stormwater within the Rio Hondo Watershed is of primary importance.

The continued supply of high quality water is a central issue of concern in Southern California. Watershed planning can address the issue through implementation of additional water conservation programs and increased groundwater recharge, as well as creative approaches to water resource management. In accordance with objectives described in the Common Ground document, this Watershed Plan addresses various strategies to achieve it's goal.

GOAL: *Improve in-stream water quality to meet or exceed Regional Water Quality Control Board standards and NPDES permitting requirements. Implement a wide array of Stormwater Best Management Practices (BMPs) to optimize local water resources and reduce dependence on imported water while increasing beneficial water uses available to the public.*

STRATEGIES AND POTENTIAL ACTIONS

3.1.2 Expand Water Supplies Through Conservation and Increased Groundwater Recharge

Increased groundwater recharge can occur in centralized municipally owned facilities such as the spreading grounds and in a more decentralized fashion on many different parcels throughout the watershed. Recharge efforts should be concentrated where soils are particularly permeable and specifically away from obstructions such as the Bellflower Aquaclude. Any known or suspected contaminated plumes should be

avoided. Most of the valley regions of the Rio Hondo Watershed are in potentially productive recharge areas above the Raymond, Main San Gabriel, and Central Basins.

There are numerous **benefits** to decentralized groundwater recharge throughout the permeable soil areas (generally the foothills and valley floors) of the watershed. Using runoff for aquifer recharge requires slowing of the runoff such that it can have time to percolate into the soil and the aquifer. This slowing of runoff reduces flood volumes in periods of high rainfall thereby reducing the scale of needed flood control facilities. This ultimately could allow for more beneficial uses in the floodway, such as habitat and recreation. Reduction of more typical runoff volumes that might be intercepted by future treatment facilities would mean smaller treatment facilities would be required and construction and maintenance costs would be lower. Additionally the natural filtering of aquifer recharge water would be occurring over a broader area and would be less susceptible to intentional contamination.

3.1.3 Recommendations for Increased In-Stream Infiltration

- Assess potential to increase infiltration through removal of concrete channel walls
- Explore partial diversion of Rio Hondo channel discharge into high or low flow natural channels
- Pursue selective restoration of soft-bottom Rio Hondo channel to enhance recharge. Consider the need for sediment management.
- Initiate selective daylighting of buried and culvertized streams, particularly in areas of highly permeable soils, and restore natural channels for recharge.

3.1.4 Utilize Natural Systems Approach to Enhance Water Conservation

- Utilize open spaces and pesticide/herbicide free landscaped areas to filter and cleanse runoff.
- Systematically prevent pollutants from entering the groundwater. Consider new practices for keeping pollutants out of the groundwater
- See more on this topic in the following section on land.

3.1.5 Implement Watershed-wide Water Conservation Programs

Opportunities to examine alternative approaches to water resource management, such as the development of new pricing strategies that better reflecting the true cost of importing expensive water supplies. These true costs would make conservation and water retention more desirable. Conservation programs could publicize opportunities and potential paybacks for on-site water retention and water conservation.

Watershed-wide Recommendations:

- Explore opportunities for new groundwater recharge to increase water supplies while simultaneously providing water for other beneficial uses such as habitat restoration.
- Identify zones of highly permeable soils. Provide increased opportunities to slow channel water and overland flow to promote infiltration within these zones
- Construct infiltration basins to capture and store water for infiltration into the surrounding soil. Prevent reduction of water conservation facilities.
- Encourage onsite collection of storm water for irrigation and percolation, where consistent with water rights
- Implement Best Management Practices (BMPs) for, parking lots, parks, roof runoff, etc. to reduce impermeable surfaces and increase on site clean-water infiltration for groundwater recharge in all land use types.

Sample Conservation Programs

- Extend the distribution and range of uses for reclaimed water
- Develop new water pricing strategies, including higher prices, which better reflect the true value of water and by doing so help conserve its use.
- Establish a credit system for implementation of BMPs, such as removal of roof downspouts that are directly connected to street gutters or other portions of the stromwater system.
- Establish a stream setback ordinance.[1]

Success Indicators / Performance Measures for Water Conservation

- Decrease in overall imported water purchases

[1] See City Oakland Stream Setback Ordinance.

- Increase in overall groundwater recharge from local rainfall
- Reduction of impervious surfaces
- Increase in number of miles of daylighted creeks over permeable soils

3.1.6 Promote the Beneficial Uses of the Rio Hondo River

The beneficial uses for various water bodies, including separate reaches and lakes within the Rio Hondo watershed were established in the 1994 Basin Plan. The areas of beneficial use may be existing uses, potential or intermittent uses. While beneficial uses are theoretically desirable they would not necessarily be appropriate for certain water bodies, such as typical flood protection channels as they currently exist. However along carefully selected water bodies expansion of beneficial uses may be possible after a Use Attainability Analysis (UAA) has been completed and agreed upon by all parties. Knowledge and focus on the actual attainability of beneficial uses will help in restoration efforts. The summary of beneficial uses, for multiple water bodies within the watershed, are listed below and more fully described in Chapter II, Existing Conditions.

- Municipal and Domestic Water Supply
- Groundwater Recharge
- Water Contact Recreation
- Non-Contact Recreation
- Warm Water habitat
- Cold Water Habitat
- Wildlife Habitat
- Wetland Habitat
- Spawning
- Rare, threatened, and Endangered Species Habitat

3.1.7 Stormwater Management Plans for All Communities in the Watershed

Each community within the watershed should have a stormwater management plan. These should be reviewed and updated to be sure they are relevant to the goals of watershed improvement. The process for developing stormwater management plans should be coordinated to systematically to address non-point pollution sources as well as opportunities for water quality improvement.

- Assess Site Conditions
- Understand Hydrologic Conditions of Concern
- Evaluate Pollutants of Concern
- Identify Candidate BMPs
- Determine BMP Size/Capacity
- Develop Plan for BMP Maintenance

3.1.8 Identify Pollutants of Concern

Tests of the water quality have confirmed the pollutants of concern in the Rio Hondo watershed since it has been designated an impaired water body on California's 303(d) list because of trash, copper, lead, zinc, ammonia, pH, and coliform bacteria.

Other pollutants that are typically of concern in urban development are shown in Table 2.1. These are pollutants that are *anticipated* as result of urban development as well as those that are a *potential* result of urban development. Anticipated in this sense would mean a pollutant likely to be found in areas of urban development and a potential pollutant would mean that it is possible to find these pollutants in unban watersheds. Their absence from the 303(d) list means that these pollutants are not present in quantities enough to penetrate the identified threshold for contamination. The pollutants described in the table probably are present in the Rio Hondo Watershed but not currently in quantities that break federal thresholds.

Table 2.1 Anticipated and Potential Pollutants Generated by Land Use Type									
Priority Project Categories	**General Pollutant Categories**								
	Pathogens	**Heavy Metals**	**Nutrients**	**Pesticides**	**Organic Compounds**	**Sediments**	**Trash & Debris**	**Oxygen Demanding Substances**	**Oil & Grease**
Detached Residential Development	X		X	X		X	X	X	X
Attached Residential Development	P		X	X		X	X	P(1)	P(2)
Commercial/ Industrial Development >100,000 ft2	P(3)		P(1)	P(5)	P(2)	P(1)	X	P(5)	X
Automotive Repair Shops		X			X(4)(5)		X		X
Restaurants	X						X	X	X
Hillside Development >5,000 ft2 In SDRWQCB			X	X		X	X	X	X
Hillside Development >100,000 ft2 In SARWQCB			X	X		X	X	X	X
Parking Lots		X	P(1)	P(2)		P(1)	X	Ps	X
Streets, Highways & Freeways		X	P(1)		X(4)	X	X	P(5)	X

X = anticipated or Likely
P = potential or Possible
(1) A potential pollutant if landscaping exists on-site
(2) A potential pollutant if the project includes uncovered parking areas
(3) A potential pollutant if land use involves food or animal waste products
(4) Including petroleum hydrocarbons
(5) Including solvents

This table from *Stormwater Best Management Practice Handbook*, Produced by the California Stormwater Association January 2003, Page 2.7

3.1.9 Establish BMP Standards for the Watershed

For the purpose of conveying the intent of Best Management Practices (BMPs) this Watershed Management Plan has adopted the standard set by the California Stormwater Quality Association which has produced a series of four BMP Handbooks for various applications. These handbooks are available for free downloading at www.cabmphandbooks.com. The four handbooks include information and BMPs for:

- New Development and Redevelopment
- Construction
- Industrial and Commercial
- Municipal Activities

3.1.10 Which is Best: Site Design, Source Control or Treatment Control?

Planning and design for water quality protection employs three basic strategies in the following order of relative effectiveness[2]. See Figure 2.1

- Reduce or eliminate post-project runoff through Planning and Design
- Control sources of pollutants
- Treat contaminated stormwater runoff before discharging to natural water bodies

Some communities have identified opportunities for water treatment facilities that have potential to improve downstream water quality (see following Chapter describing proposed projects). As the diagram demonstrates, these treatment facilities provide the least benefit to the overall watershed, because they do not treat the water contamination problem at the source. The benefit of water treatment strategies is that they do improve downstream water quality fairly immediately once treatment has begun. The drawback is that increased water volumes that carry pollutants from urban runoff in the upper watershed remain unchecked and the need for treatment increases over time. However, used in combination with source control, the treatment volumes can be reduced, and upstream water quality can be improved. **A combination of all strategies will provide the maximum benefit to the watershed.**

[2] California Stormwater Quality Association, January 2003

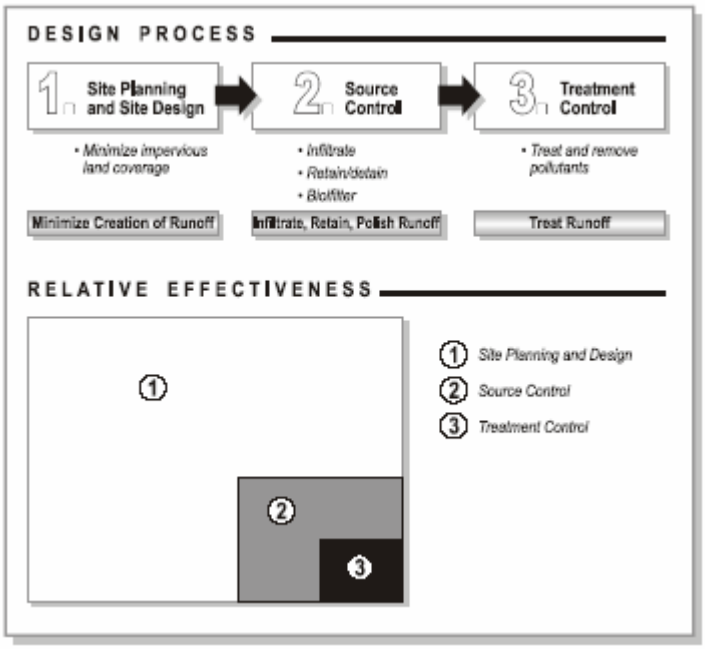


Figure 2.1 Relative Effectiveness of Three Types of BMPs

3.1.11 BMPs for Site and Facility Design

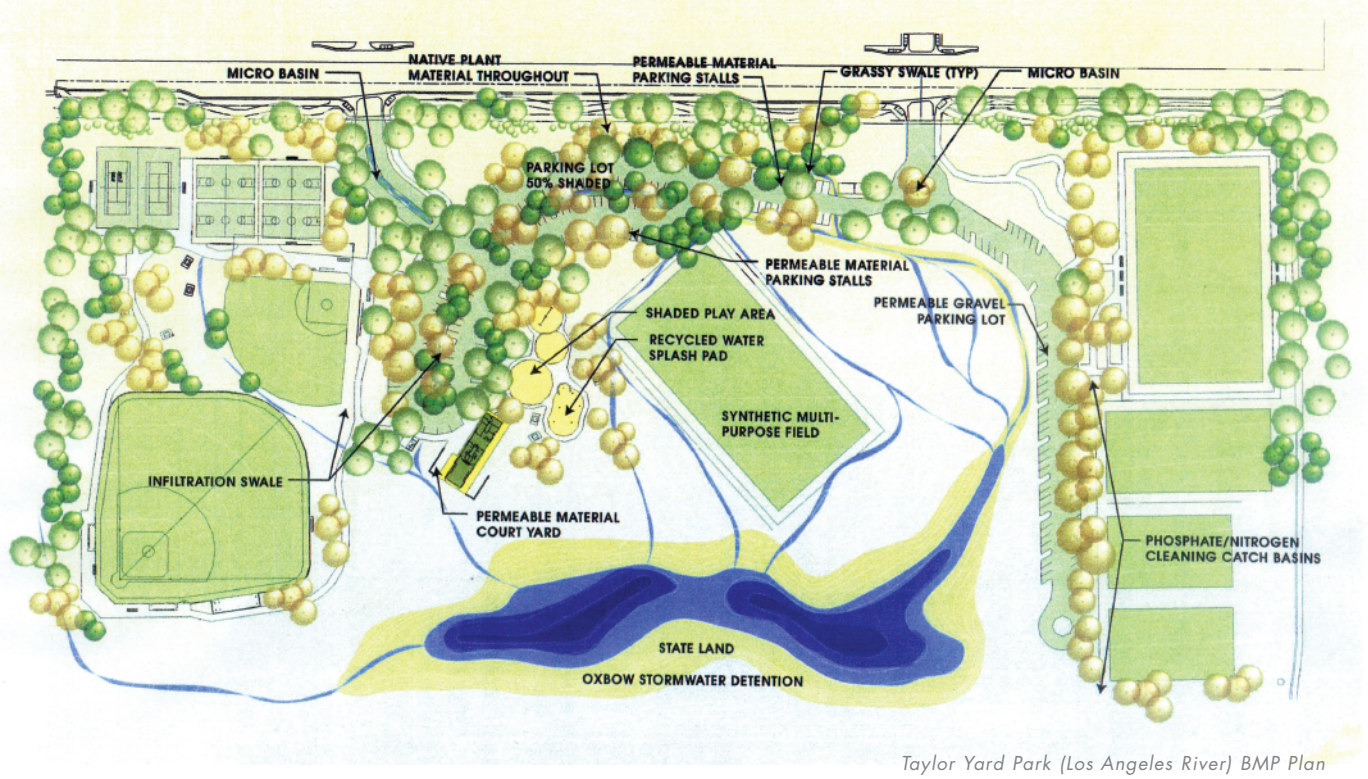
Because the mid and lower Rio Hondo Watershed is largely built out new construction opportunities are fairly limited. However there are opportunities for improving water quality through site planning and design and in building permit review of new and redevelopment plans to insure incorporation of proper site and facility design BMPs. In the upper watershed, site planning and incorporation of BMPs for hillside construction and development will be of particular importance. In reviewing plans for redevelopment projects implementation of numerous multi-purpose site design BMPs will encourage at-the-source treatment of storm water runoff. If implemented in a systematic basis, these BMPs will provide the longest term benefits to overall improvement of water quality within the watershed.

Site and Facility design can improve water quality within the watershed and streams derived by filtration through vegetation, most ideally as close as possible to the source of the runoff[3]. It is possible to make this happen throughout the watershed in many places, including:

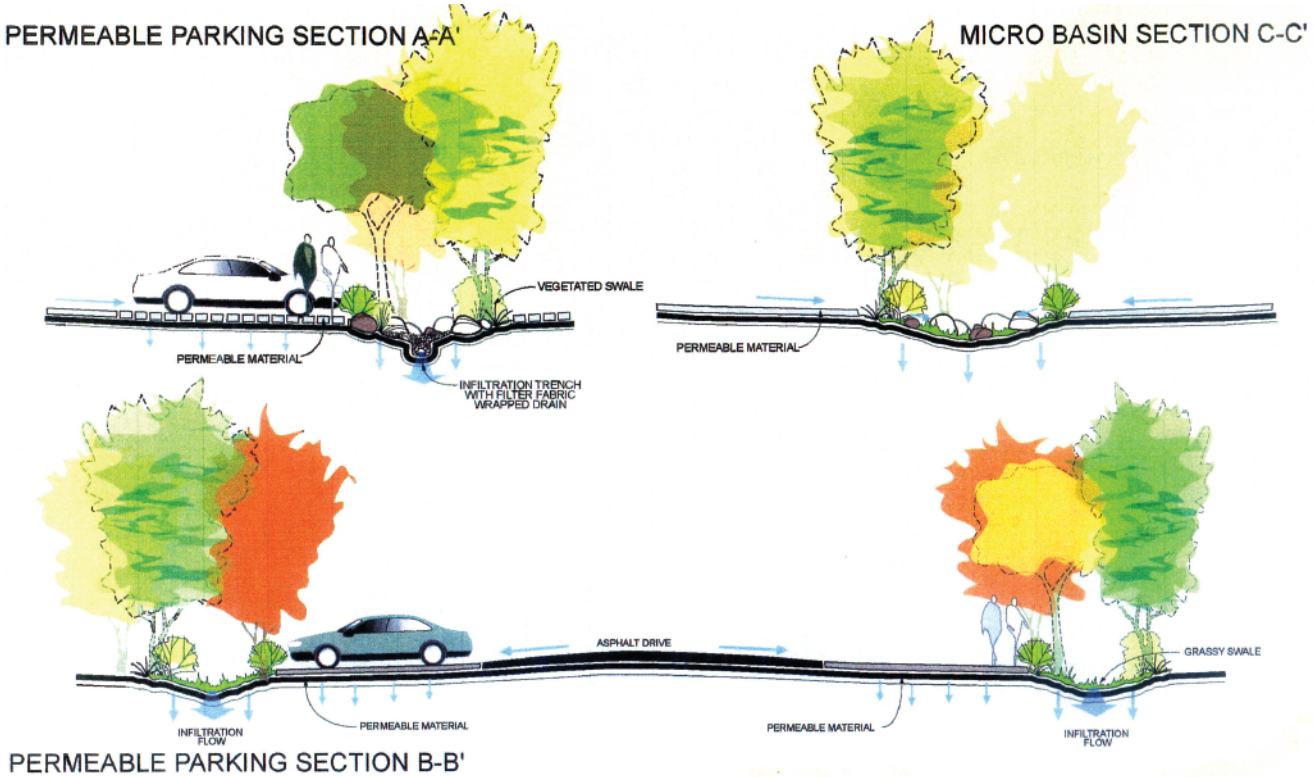
- Along streets and highways in parking areas, parkways, and medians
- Parking lot edges or landscaped dividers
- Residential backyards
- In leftover open spaces such as vacant lots or underutilized lands
- Along utility corridors
- Outdoor Work Areas
- Maintenance and Storage Areas
- Vehicle and Equipment Washing Areas
- Loading Area
- Trash Storage Area
- Wash Areas
- Fueling Areas

3 For more information see The Stormwater and Best Mangement Practice Handbook for New Development and Redevelopment, Section 3- Site and Facility Design for Water Quality Protection, produced by the California Stormwater Quality Association, Jan. 2003

Conceptual BMP Integration at Taylor Yard Park



Taylor Yard Park (Los Angeles River) BMP Plan
(Courtesy of Rivers and Mountains Conservancy)



Taylor Yard Park Parking Lot BMP Cross Section
(Courtesy of Rivers and Mountains Conservancy)

3.1.12 BMPs for Source Control of Stormwater Runoff

Source Control BMPs offer the best opportunities for overall improvement of water quality within the watershed because they treat water contaminates before they enter the stream system. Source Control BMPs are typically small scale and decentralized. The cost of implementing any individual project is low, yet their combined benefit to the watershed over time is among the highest. Established communities in the Rio Hondo watershed are continually redeveloping and it is during these redevelopment applications that implementation of Source Control BMPs can be easily incorporated into permit requirements.

- All municipalities incorporate Source Control BMPs in their permit application requirements.

Site Designed (SD) BMPs for Source Control of stormwater runoff are well documented. The typical BMP titles are provided here, for a complete description please refer to Section 4 of the Stormwater Best Management Practices Handbook, as previously referenced.

Site Design
SD-10 Site Design & Landscape Planning
SD-11 Roof Runoff Controls
SD-12 Efficient Irrigation
SD-13 Storm Drain Signage

Material Selection
SD-20 Pervious Pavements
SD-21 Alternative Building Materials

Commercial and Industrial Area Considerations
SD-30 Fueling Areas
SD-31 Maintenance Bays & Docs
SD-32 Trash Storage Areas
SD-33 Vehicle Washing Areas
SD-34 Outdoor Material Storage Areas
SD-35 Outdoor Work Areas
SD-36 Outdoor Processing Areas

3.1.13 Stormwater Pollution Prevention Plans for Construction

The Stormwater Pollution Prevention Plan or SWPPP is a document that addresses water pollution control during construction. A SWPPP must be prepared before construction begins, ideally during the project planning and design phases. The information required by the SWPPP may need the design to be modified to incorporate controls during construction and post-construction.

In many communities a construction project is subject a SWPPP only if it disturbs one acre or more of soil. However, the local municipality or Regional Water Quality Control Board (RWQCB) *could* require the development of a SWPPP for all projects that require a grading permit or if it is determined that the project poses a significant water quality risk threat.

Soil laboratory analysis may be required should prior contamination be suspected. The selection and implementation of construction BMPs would be affected by what existing features need to be protected or mitigated during construction. The grading and drainage plan should identify areas of cut and fill, slope during and after grading, protection of existing vegetation, and areas of soil disturbance. They also form the technical basis for selection of erosion and sediment control BMPs.

Implementation of the SWPPP begins when construction begins, typically before the initial clearing, grubbing, and grading operations, since these activities can usually increase erosion potential on the site.

- Municipalities should review policies regarding SWPPP preparation for projects disturbing areas of less than one acre.
- Require incorporation of stormwater BMPs for all projects.

3.1.14 BMPs for Erosion and Sediment Control During Construction

This section outlines those BMPs that are appropriate to new construction that could be permitted within the Rio Hondo watershed. BMPs for new construction differ from those within existing neighborhoods in that they focus on erosion control and sediment reduction on the construction site. The **benefits** derived from implementation of these BMPs will exhibit themselves in areas where new construction is most prevalent, typically on the urban fringe, or in the upper portion of the

watershed. This is good because anything that benefits the upper watershed also benefits the water quality the lower watershed.

Erosion control is any source control practice that protects the soil surface and prevents soil particles from being detached by rainfall, flowing water, or wind. Erosion control is also referred to as soil stabilization. Erosion control consists of preparing the soil surface and implementing one or more of the BMPs, to disturbed soil areas.

All inactive soil disturbed areas on the project site, and most active areas prior to the on set of rain, must be protected from erosion. Soil disturbed areas may include relatively flat areas as well as slopes. BMPs to reduce erosion from construction sites include:

EC-1 Scheduling
EC-10 Velocity Dissipation Devices
EC-11 Slope Drains
EC-12 Streambank Stabilization
EC-13 Polyacrylamide
EC-2 Preservation of Existing Vegetation
EC-3 Hydraulic Mulch
EC-4 Hydroseeding
EC-5 Soil Binders
EC-6 Straw Mulch
EC-7 Geotextiles and Mats
EC-8 Wood Mulching
EC-9 Earth Dikes and Drainage Swales

Sediment control BMPs include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped. Sediment control practices can consist of installing linear sediment barriers (such as silt fence, sandbag barrier, and straw bale barrier); providing fiber rolls, gravel bag berms, or check dams to break up slope length or flow; or constructing a sediment trap or sediment basin. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, down-slope of exposed soil areas, around soil stockpiles, and at other appropriate locations along the site perimeter.

SE-1 Silt Fence
SE-10 Storm Drain Inlet Protection
SE-11 Chemical Treatment
SE-2 Sediment Basin
SE-3 Sediment Trap
SE-4 Check Dams
SE-5 Fiber Rolls
SE-6 Gravel Bag Berm

SE-7 Street Sweeping and Vacuuming
SE-8 Sandbag Barrier
SE-9 Straw Bale Barrier

Tracking control consists of preventing or reducing the tracking of sediment off-site by vehicles leaving the construction area. Attention to control of tracking sediment off site is highly recommended, as dirty streets and roads from a construction site drain into nearby stormdrains and nearby creeks. BMPs for Tracking Control include:

TC-1 Stabilized Construction Entrance/Exit
TC-2 Stabilized Construction Roadway
TC-3 Entrance/Outlet Tire Wash

Wind erosion control consists of applying water or other dust palliatives to prevent or alleviate dust nuisance. The wind erosion control best management practice (BMP) is referenced. Other BMPs are sometimes applied to disturbed soil areas to control wind erosion (BMPs EC-2 through EC-7).

WE-1 Wind Erosion Control

Temporary concentrated flow conveyance control BMPs:

EC-9, Earth Dikes and Drainage Swales
EC-10, Velocity Dissipation Devices
EC-11, Slope Drains

Seattle Street Swale BMP Project

a.

b.

c.

d.

a. Seattle Street Before Creating Swale
b. Seattle Street After Creating Swale
c. Seattle Street Swale Aerial Photo
d. Seattle Street Swale Detail
(All Courtesy of Seattle Public Utilities)

Case Study 2: T.R.E.E.S. and Hall House B.M.P. Demonstration Site

A Template for Retrofitting Los Angeles

In 1997, the T.R.E.E.S. (Trans-Agency Resources for Environmental and Economic Sustainability) brought together a coalition of Los Angeles public agencies and environmentalists "…to design the retrofit of Los Angeles as a living watershed." The group developed a series of Best Management Practices for (BMPs) for industrial sites, commercial buildings, schools, multi-family housing, and single family homes resulting in a "blueprint for an ecologically, socially, and economically sustainable Los Angeles."

T.R.E.E.S created The Hall House demonstration site, a single-family residence in south central Los Angeles. The site uses lot-level low impact development practices designed to capture and treat all the runoff from this residential site. These include a cistern collection system, redirection of roof-top runoff, vegetated/mulched swales, and retention upgrading to reduce runoff pollution. Most of the BMPs are relatively inexpensive.

The T.R.E.E.S demonstration site uses natural systems to reduce the increased runoff from urbanization. The techniques have significant potential to reduce water pollution when applied throughout a watershed. The BMPs are cost effective and successful at capturing, cleaning, and storing runoff, reusing water, to reduce runoff while improving urban forests and watershed management. If applied throughout Los Angeles, project managers anticipate significant reduction in the need for water imports.

The Project has also developed detailed BMP site designs for other specific locations throughout the City of Los Angles, with the goal of demonstrating the viability of treating every site in the region as a mini-watershed. These site proposals include:

- A multi-housing site BMP design for the Harbor Vista Apartments in the Wilmington District of Los Angeles, which features graywater irrigation, filter beds to pre-treat runoff, and a subsurface infiltration basin under the parking area to capture and treat all rainwater that falls on the site.
- A public school site BMP design for Crenshaw High School. Stormwater on the site is slowed and cleansed through the use of porous parking areas, soil filtration through lengthy vegetated swales, and use of more shade trees. The large open areas of this and other school sites, could be used to improve both on-site runoff but also runoff from surrounding streets at little additional cost.
- A commercial site BMP design for Jiffy Lube and Convenience Commercial in Santa Monica. 90% of the site area is pavement and roof surface. The design makes site surfaces more permeable to facilitate water infiltration and enhance flood control; while capturing and removing pollutants from stormwater runoff.

- An industrial site BMP design for Conjunctive Points, Culver City and Los Angeles. Strategies proposed include modification of the existing flood control channel on the site to increase capacity and provide recreation space close to water. Concrete removal could allow for regarded vegetated areas and partial reconstruction the site, using permeable materials such as gabion walls and vegetated areas.

Excerpted from:

Natural Resources Defense Council (www.nrdc.org), Stormwater Strategies: Community Responses to Runoff Pollution.
Tree People (www.treepeople.org/trees) T.R.E.E.S. Project Overview

3.1.15 BMPs for Source Control at Industrial and Commercial Facilities

The following BMPs have been established by the California Stormwater Quality Association (CASQA) for Industrial and Commercial facilities. These BMPs are intended to reduce the potential of pollutants from entering the stream system. They are taken from the CASQA handbook on the subject, which is available at www.cabmphandbooks.com : The **benefits** derived from incorporation of these BMPs will exhibit themselves as soon as they are implemented in the various pockets of industrial and commercial land uses throughout the middle and lower portions of the watershed. Bacause of the nature and volume of potential pollutants from industrial and commercial facilities the benefits derived from incorporation of Best Management Practices could be fairly immediate. The BMPs for Industrial and Commercial land uses are as follows:[4]

Non Stormwater Management
SC-10 Non-Stormwater Discharges
SC-11 Spill Prevention, Control and Cleanup

Vehicle and Equipment Management
SC-20 Vehicle and Equipment Fueling
SC-21 Vehicle and Equipment Cleaning
SC-22 Vehicle and Equipment Repair

Material and Waste Management
SC-30 Outdoor Loading/Unloading
SC-31 Outdoor Liquid Container Storage

[4] For more information see *The Stormwater and Best Mangement Practice Handbook* for Industrial and Commercial Facilities, Section 3- Source Control BMPs, produced by the California Stormwater Quality Association, Jan. 2003

SC-32 Outdoor Equipment Operations
SC-33 Outdoor Storage of Raw Materials
SC-34 Waste Handling and Disposal
SC-35 Safer Alternative Products
SC-40 Contaminated or Erodible Areas

Building and Grounds Management
SC-41 Building and Grounds Maintenance
SC-42 Building Repair and Construction
SC-43 Parking/Storage Area Maintenance
SC-44 Drainage System Maintenance

3.1.16 Implementation of Design, Source Control, and Erosion Control BMPs

Municipalities that issue building permits have the best ability to affect the quality of stormwater over time. With regulations to require integration of BMPs into the issuance of building permits *all* waters within the watershed will improve over time. Please see the inset for some early case studies about the design and implementation of BMPs in the Los Angles Area.

3.1.17 Establish Recurring Maintenance Schedule for Treatment Control Facilities

Designing treatment control facilities is the first step in creating a treatment protocol for the watershed. Integral to that process is planning for the long-term maintenance of the treatment facility. Inspection and maintenance are required wherever treatment control BMPs have been implemented. These maintenance and inspection activities are needed to insure that the treatment control facilities continue to work efficiently and effectively throughout their design lives.

- A schedule of maintenance and inspection activities should be established to insure effective performance of treatment facilities in the watershed.

Two types of treatment control facilities are typically utilized, those in the public domain and those that are proprietary. The BMPs cited here are so segregated. For more information about these Maintenance Control Fact Sheets please reference the California Stormwater Quality Association's is website at http://www.cabmphandbooks.com/Documents/Industrial/Section_4.pdf.

Maintenance for Public Domain Treatment Control Facilities

TC-10 Infiltration Trench
TC-11 Infiltration Basin
TC-12 Retention/Irrigation
TC-20 Wet Pond
TC-21 Constructed Wetland
TC-22 Extended Detention Basin
TC-30 Vegetated Swale
TC-31 Vegetated Buffer Strip
TC-32 Bioretention
TC-40 Media Filter
TC-50 Water Quality Inlet
TC-60 Multiple Systems

Maintenance for Manufactured (Proprietary) Treatment Control BMPs

Manufacturers typically have recommended inspection schedules and maintenance requirements for each treatment control device. If proprietary treatment control devices are utilized, a maintenance agreement and detailed maintenance plan should be developed. For many manufactured devices owners can contract with the manufacturer or representative to provide maintenance.

MP-20 Wetland
MP-40 Media Filter
MP-50 Wet Vault
MP-51 Vortex Separator
MP-52 Drain Inlet

3.1.18 Development and Implementation of TMDLs

TMDLs or Total Maximum Daily Loads for certain specific pollutants are established for impaired reaches of streams that have not been able to comply with EPA standards of section 303d of the Federal Clean Water Act. (Please see the preceding existing conditions section for location of the impaired reaches). In California the local Regional Water Quality Control Board (RWQCB) is responsible for establishing the TMDLs.

The RWQCB is in the process of establishing goals for the reduction of pollutants in impaired reaches. When the TMDL goals are ultimately established, municipalities will have the responsibility to achieve them. Implementation of the previously described BMPs will help to achieve the new TMDL goals.

3.1.19 Ways to Reduce Key Pollutants of Impaired Reaches

On the Rio Hondo reaches have been identified as impaired because of the presence of trash and bacteria. An actual trash removal program, or creek clean-up program, through the riparian corridors of the watershed is an effective way to both clean the stream channels and to establish baseline information on the structure and condition of the stream reaches. Other opportunities to reduce trash in the streams include fines for littering and public education campaigns.

Bacteria is another prevalent problem that exhibits itself throughout the watershed. Its presence, along with other contaminants, reduces the quality of water available for groundwater recharge and the ultimate water supply for Los Angles County. Bacteria in streams typically results from three potential sources which could be controlled:

1. Food or animal by-products that enter the stream channel
2. Cross connections or leaking of the sewer system into the stormwater system.
3. Fecal matter from human encampments and/or pet waste that enters streams.

Reduction of other key pollutants from the stream system can take many forms, utilizing creative ways to provide labor and oversight. Some suggestions include:

- Establish stream cleaning teams to remove trash, to perform baseline data collection and to visually inspect the stromwater conveyance system.
- Utilize the California Conservation Corps (CCC) or other entity to provide labor while providing educational opportunities for those involved.
- Educate the public on the structure of the watershed and the location of streams
- Continue BMP requirement for restaurant wash down areas to prevent food products from entering the stream channels.
- Track down cross connections and leaking sewer systems promptly.
- Require pet owners to clean up after their pets no matter where they are in the watershed. Provide signs and plastic bags at trailheads and in public areas.

Compliance for the TMDL program for municipalities could be eased by establishing collaborative efforts to implement a water quality improvement program and to improve opportunities for funding.

Success Indicators / Performance Measures for Water Quality

- Incorporation of BMPs into municipal codes and permit evaluations.
- Incorporation of BMPs into municipal maintenance yards and along state and federal highways, with public promotion of the benefits derived from pilot projects.

- Timely and reasonable establishment of TMDL standards for pollutants of concern in the Rio Hondo watershed. These include: Nitrogen and related effects, pH, coli form, Trash, Chromium, Zinc, and persistent pesticides (DDT and Chlordane) in Peck Road Lake.
- Compliance with newly established TMDL standards and elimination of impaired status for Rio Hondo Reaches 1 and 2 and Peck Road Lake.
- Increased use of the beneficial aspects of riparian buffers in restoration efforts along reaches of the Rio Hondo Watershed.
- Improvements in runoff water quality so as to alleviate concern about contamination of groundwater resources from local rainfall.
- Reduction of impervious surfaces

3.2 ACQUIRE, DEVELOP AND MAINTAIN MULTI-USE OPEN SPACE

The lack of sufficient open space is a significant issue for the highly urbanized Rio Hondo Watershed, especially given projected increases in the future population. Although open space can take many different forms – parks, greenways, natural areas, and "vacant" lands – many value the presence of this land use type. The Plan includes a variety of strategies designed to preserve existing open space areas, as well as opportunities to reclaim land that could become open space in the future.

GOAL: *Create, enhance, and protect open space through active acquisition of parcels that serve multiple-purpose uses, including; conservation, improvement of aesthetics, community development and connectivity.*

The conversion of underutilized lands currently zoned for commercial, industrial, and residential uses may represent a long-term opportunity to create new open space. Although many cities will evaluate the economic development potential of such sites, the value of such properties can be enhanced where there is an open space component. This approach may be especially valuable in what are now heavily developed areas, as older buildings and facilities reach the end of their useful lifespan. The expansion of existing parks is another strategy well suited for heavily developed areas. Opening up selected portions of utility corridors by providing community and habitat-friendly uses such as gardens, parks, and trails can significantly expand open space resources.

The overall strategy underlying these actions is improving overall access to open space areas and recreation facilities in a heavily developed urbanized area. The Rio Hondo and its tributaries offer significant opportunities for achieving that goal in both the short-term and long-term future.

3.2.1 The Need For Open Space, Habitat Connectivity, and Recreation

In the previous chapter describing the Existing Conditions of the Rio Hondo Watershed the following findings were established.

Communities

- The watershed is largely built out, with very little new development taking place;
- The communities of the watershed are demographically complex with wide ranging differences in income, population density, ethnicity, and languages spoken
- The Rio Hondo is rich in a variety of cultural and historic resources.

Open Space

- There is a scarcity of open space in the developed portions of the watershed. Also because of the absence of open space, the management infrastructure necessary to support them is also absent.

Habitat Condition

- Most native habitat has been converted to urban uses and the small patches of remaining habitat may not be adequate to support native species.
- Native species have been negatively impacted by an invasion of non-native species.

Recreation

- In terms of acreage and accessibility, there are an insufficient number of parks to serve the existing population within the watershed.

3.2.2 Establish Land Use Policies and Development Standards to Encourage Open Space in the Watershed

- Define open space as infrastructure designed to support the health of the watershed.
- Promote the benefits of converting land to open space to cities and the public
- Create more livable communities by integrating open space near to where people live
- Promote and design for multi-modal transportation modes with less impact on the watershed
- Acquire and utilize open space for multiple purposes including, water retention, habitat protection and enhancement, and recreation.

- Establish a mitigation bank to focus mitigation efforts and leverage other projects within the watershed
- Review, revise, and update local land use, zoning, and building codes to encourage open space in strategic locations so as to mitigate impacts of urbanization in the watershed.
- Coordinate land management policies and procedures among jurisdictions
- Work with local utilities to explore the potential for opening up utility corridors as public open space.

3.2.3 Actively Acquire Open Space Through Strategic Land Acquisition

- Utilize GIS information resources to support resource management and land acquisition planning.
    - Create property map to show opportunity sites for possible acquisition.
    - Identify a portfolio of potential projects to draw from when funding becomes available.
    - Compile list of projects needing possible mitigation plans
    - Consider potential open space uses such as trails and bike paths, as well as small -scale opportunities, such as community gardens.
- Establish priorities for land acquisition, coordinating targeted land acquisitions with land use planning including protection of upland areas as a priority acquisitions.
- Establish a permanent source of funding for open space acquisition, development, AND maintenance.
- Utilize conservation easements in lieu of fee title agreements where appropriate.
- Plan for new open space acquisitions to meet multiple objectives

3.2.4 Open Space Supporting Combined Needs of the Watershed

- Identify land acquisition opportunities in urban areas, along river and tributaries, and in the foothills.
- Recycle brownfields properties and abandoned commercial and industrial sites as new open space.
- Examine the potential of gravel quarries for future open space and other beneficial watershed uses.

- Improve the aesthetic quality of the river corridor, along tributaries, and in other open space areas of the watershed.

3.2.5 Improve Access to Open Space and Recreation for all Communities

- Evaluate access by population density, distance and time for each type of open space
- Expand and improve existing facilities
  - Meet site design standards for special user needs
  - Include in all site programming adequate parking, access via public transportation, and facilities for buses
- Provide for active and passive recreational uses
- Incorporate passive/low impact recreational uses and storm water re-capture
- Create a network of trails to provide connections between open space areas.

Preserve, Enhance and Restore Native Habitats Within Open Space

- In areas where habitat values predominate avoid improvements that would jeopardize those values.

3.2.6 Promote Stewardship of the Landscape

- Utilize drought tolerant and native plant materials
- Supply best Management Practices that support habitat and water quality goals
- Identify historical sites and cultural landscapes
- Support community gardens and water-wise and native plant gardens.
- Create a process to ensure consistent management and staff for all open space areas, including existing and future parks.

Success Indicators / Performance Criteria for Open Space

- Increased open space protection by conservancies in perpetuity
- Increase in acreage of open space areas for public use through land use conversion of abandoned transportation corridors or underutilized industrial or commercial properties
- Increased connectivity and access for all communities
- Ability for all neighborhoods to have easy access to some form of open space such as parks, creeks or community gardens via trails, low-cost transportation, walking distance
- Accumulation of acquisition and long-term maintenance funds through local bond measures, endowments, capital campaigns and other means
- Development of stewardship and maintenance plans for as long as open space is to remain open, in many cases, in perpetuity
- Active participation by and creation of local stewardship groups in all communities
- The development of livable communities integrates open space, habitat, and water conservation principles
- All future development, new or retrofits, incorporate multi-objective design principles
- Open space and habitat increases even as population grows; water quality improves and imported water quantity is reduced
- All cities in the watershed and Los Angeles County adopt healthy watershed development standards.
- The watershed is cited as a model of "green development"

Case Study 3: Blackberry Creek

Berkeley, California

"Daylighting" A Stream

In 1995, a 250-foot reach of creek was taken out of a culvert underneath a schoolyard. This stream daylighting project turned an asphalt lot into a well-used outdoor science classroom. The creek was planted with native willows, dogwood, alders, and wild rose. Neighbors enjoy the running water and surrounding park in the schoolyard. Collaboration between many private and public organizations, state funding, and labor from a job-training program made the project possible.

Blackberry Creek runs to the San Francisco Bay from the hills in the northern part of Berkeley. The creek flows through a dense single-family-home neighborhood in a narrow but relatively natural riparian corridor upstream from the school. At that point it ducks into a culvert running under the school. This culvert had a history of backing up in large storms, with the excess water flooding out onto nearby streets through its catch basins.

In 1992, a local PTA member proposed improving the school park and broaching the idea of daylighting Blackberry Creek there. The idea of providing an outdoor environmental education classroom and living lab for the school was a key selling point, as was the opportunity to address the flooding problem and provide a better park for the neighborhood.

In 1995, a heavy equipment contractor dug out the 1950's era culvert and roughed out banks and meanders for the new stream channel. The restoration effort created 250 feet of new channel. It drops two feet between the culverts upstream and downstream. To control velocities and orient the channel, the designers specified four shallow rock weirs, each anchored deeply in the streambed. Because the stream channel is 10 to 13 feet below the surrounding level of the land, the designs gave close attention to erosion control on the banks. Crews placed large rocks on th outside banks of each meander and stabilized other banks with a variety of bioengineering techniques; fascines, brush layering, pole cutting, and natural or biodegradable erosion-control fabrics. The surrounding neighborhood now enjoys a restored 0.6 acre park with a lawn, creek, creekside path, and picnic area.

A $144,000 grant from the California Department of Water Resources Urban Stream Restoration Program paid for planning, grading, hauling away fill, burying the excavated culvert on site, installing irrigation for the park, and conservation corps labor. If all funds and donations and foregone fees are totaled, the project probably cost about $200,000. A significant portion of this went toward the playground and park amenities, not just the stream restoration.

Excerpted from: Richard Pinkham, Rocky Mountain Institute*, Daylighting: New Life for Buried Streams,* 2000.

3.3 HABITAT ENHANCEMENT STRATEGIES

Many opportunities to enhance habitat currently exist in the watershed. The overall strategy is to implement smaller projects today, such as integrating habitat into school and park improvement projects, while beginning long-term planning for the creation of habitat linkages along the Rio Hondo and tributaries. There are also existing habitat areas that need immediate protection through land acquisition or removal of exotic invasive plants such as *Arundo donax*. Implementation of both short-term and long-term measures will help to ensure biodiversity not only within the Rio Hondo Watershed, but for also the South Coast Ecoregion.

The major long-term strategies include the re-establishment of habitat connectivity between Whittier Narrow and the San Gabriel Mountains, restoration of aquatic species to the Los Angeles River system, the protection of existing habitat, creating connections between small habitat fragments, and enlarging these fragments.

GOAL: *Improve habitat quality, quantity and connectivity with watershed management and restoration of stream channels. Combine existing habitat, and creation of new habitat where possible to strengthen habitat migration corridors. Establish habitat areas for use by wild creatures, and other habitat areas with the addition of public access and education as appropriate.*

3.3.1 Identify and Protect Existing High Quality Habitat and Ecologically Significant Areas

Identification and protection of habitat for threatened and endangered species' and significant natural areas' requires clarification of biological priorities.

- Protect significant remaining open space habitat, particularly in the upper watershed.
- Extend habitat into urban areas particularly along stream corrdiors
- Encourage native plantings for bird and butterfly habitat in back yards

- Incorporate areas of native habitat into development on private and public lands
- Protect habitats from incompatible human uses
  - Balance wildlife with human uses, such as recreation
  - Soften the urban edges of habitat areas by planting trees between streets and habitats, directing lighting away from habitat areas, and other methods
- Control litter and dumping
- Enforce Significant Ecological Areas protection measures

3.3.2 Reduce Habitat Fragmentation by Establishing Wildlife Corridors and Nodes

- Enhance connections between remaining wildlife populations so genetic exchange between populations can resume between Puente Hills, Whittier Narrows Recreation Area, Santa Fe Dam floodplain, and Angeles National Forest
- Minimize the effects of barriers and choke points that create impediments to wildlife movement
- Establish habitat area design standards for the most sensitive species that might possibly use a corridor
- Discourage urban development in floodplain & habitat areas
- Improve connectivity by planting native species in unvegetated areas such as the levees of flood control channels. Appropriate native species would depend on the amount of water available for plant growth
  - Riparian plants such as willows and mulefat in regularly saturated soils,
  - Riparian/coastal sage scrub edge species such as coyote brush in areas that receive some water,
  - Coastal sage scrub species such as California sagebrush and buckwheat in dry areas on steep slopes above basins and channels
- Improve connectivity and habitat values in watershed by replacing non-native trees in landscaped areas such as parks and golf courses with native trees such as sycamores and live oaks

3.3.3 Coordinate Efforts to Remove Invasive Species

- Prohibit planting of listed invasive/exotic plant species in parks, recreation, open space or habitat areas
- Encourage use of native plants in parklands or river corridor and adjacent areas
- Educate private landowners at edge of habitat areas on benefits of native plants and limiting exotic invasive plant species
- Remove invasive non-native species such as arundo, castor bean, and Russian thistle and prevent their spread or migration upstream
  - Focus on arundo removal as an important priority activity where it is possible to enhance the habitat value of existing non-develop areas
  - Manage exotic species such as arundo infestation in soft-bottom segments of stream
- Utilize Best Management Practices for management of habitat areas
- Engage in long term maintenance and management to ensure invasive species do not return

3.3.4 Restore and Enhance Degraded Aquatic and Terrestrial Riparian and Upland Habitat Areas

- Protect native vegetation & encourage native plant restoration
- Require mitigation efforts for impacts to existing habitats
  - Pursue regulatory opportunities to avoid degradation related to development.
  - Identify offsetting mitigations within the watershed that could be used if on-site mitigation is impossible.
  - Incorporate monitoring and maintenance procedures into restoration plans
  - Pursue habitat restoration in balance with other watershed goals
  - Ensure sufficient and appropriate flow conditions to support riparian river habitats, and aquatic species/fisheries while maintaining existing water rights
  - Restore and enhance habitats without compromising flood protection or public health
  - Reconcile habitat enhancement with water quality issues
  - Increase acreage of coastal wetland habitats while minimizing vector breeding
  - Landscape levees with native riparian vegetation wherever possible without compromising flood control capabilities

- Landscape spreading facilities without compromising recharge capabilities

3.3.5 Manage the Introduced and Native Wildlife Populations to Ensure a Healthy Balance

- Enhance specific species that have experienced decline
- Identify indicator species and develop standards and monitoring systems based on these key indicators.
- Maintain or reduce populations of wildlife meso-predators (raccoon, feral cats, opossum, skunk) and rodents that may transmit vector-borne diseases
- Discourage wildlife encroachment into surrounding urban areas
- Maintain or increase the population of prey species (amphibians, reptiles, small mammals and birds)

3.3.6 Educate the Public About Living with Wildlife

- Encourage residents to use native plants and materials that reflect the river/watershed identity and provide some habitat value
- Provide guidelines to coordinate habitat preservation efforts between agencies, jurisdictions, and private lands
- Educate residents on the urban-wild land interface on living with wildlife
- Educate visitors to natural areas on how to safely be in wildlife habitat areas
- Form business partnerships to encourage nurseries to sell native plant species

Success Indicators / Performance Criteria

- Creation of habitat linkage between Whittier Narrows/Puente Chino Hills and San Gabriel Mountains with plant and animal movement tracking
- Connectivity of smaller habitat patches with linkages
- Enlargement of small habitat areas to larger ones
- Increase of biodiversity
- Increased populations of sensitive species, resulting in lowering or eliminating of sensitive, rare, threatened or endangered classifications
- Self-sustaining habitat areas that requires little to no maintenance or exotic plant and animal removal, only occasional monitoring
- Return of habitat disturbances that have been altered including seasonal flooding, sediment transport, and small patch fires
- Increased acreage of native habitat areas
- Widespread knowledge of co-habitating with wildlife
- Return of aquatic species such as steelhead trout
- Return of other extirpated species of plants and wildlife

3.4 RECREATION DEVELOPMENT STRATEGIES

Recreation is a highly valued community resource that is directly impacted by the health of the watershed. Due to the dense populations of the watershed and currently limited open space resources, recreational opportunities need to be maximized. Park-poor communities need funding and technical assistance to provide recreational resources for their residents. Cost-sharing agreements between neighboring cities or public landowner (such as the Angeles National Forest) can optimize recreational opportunities by providing additional resources required to maintain parkland for visitors.

Improving recreational opportunities within the watershed by enhancing existing parks and trails can also enhance watershed awareness and identity. Currently there are numerous bicycle and equestrian trails, but few are well marked, and connections are tenuous. Projects to improve signage, create multi-lingual maps, and an integrated system of amenities will result in a more attractive and safe trail experience. Increased access to trails, including safe urban trail linkages along surface streets or utility corridors are needed. In addition, although the Rio Hondo is rich in cultural and historic resources these have not yet been used to promote watershed awareness and support.

GOAL: *Improve recreational opportunities as a function of watershed management. Use interpretative opportunities afforded by recreation to enhance watershed awareness and identity.*

3.4.1 Plan Recreation Facilities to Meet Multiple Objectives

Recreational facilities should be planned from a watershed-wide perspective to best integrate recreation needs, water quality and habitat requirements. An additional benefit would be the ability to leverage funding for multi purpose projects.

- Build low-impact recreational opportunities, in combination with water management facilities, at strategic locations in the watershed
- Optimize water flow and maintenance activities for wildlife habitat to support environmental education activities
- Provide for groundwater infiltration where possible to meet water quality goals
- Provide recreational site design, planting, lighting and maintenance that support habitat goals and objectives
    - Provide habitat where possible and minimize impacts to adjacent sensitive areas;
    - Design recreational sites to also serve as wildlife corridors, where appropriate
    - Optimize water flow and sediment removal activities for fish habitat to support fishing activities.

3.4.2 Improve Access to Recreation for all Communities

- Provide both active and passive recreation opportunities throughout the watershed
- Use the natural areas of the Rio Hondo as a resource for passive recreational opportunities
    - Provide access to the Rio Hondo River, especially for nearby communities
    - Enable densely developed and park-poor communities to have access to these resources
- Improve the aesthetic quality of the Rio Hondo corridor and its tributaries
- Establish interpretive centers at key natural areas in the watershed, providing a link between environmental education, recreation, habitat and open space
- Maintain and establish recreational resources for an active equestrian community

3.4.3 Connect Open Space and Recreation Areas with a Network of Trails

- Provide a continuous bike trail, equestrian and public access system along the Rio Hondo, its tributaries, and other key watershed corridors
  - Connect LA County trails with the Rio Hondo River Trail
  - Provide trail connections between the Rio Hondo and the San Gabriel rivers
  - Connect recreation areas to transit access points
- Provide for public security, safety, and amenities along waterways and trails
  - Establish design standards for trails to safely accommodate multiple users of all ages and abilities
  - Include shade, river access, rest areas, maps/signs, mile markers, landmarks, lighting, emergency call boxes and other amenities for trail users
  - Provide trails that are designed for low maintenance
  - Provide access for routine maintenance and emergency use
- Establish landmarks and signage that allows trail users to experience a positive awareness of the watershed

3.4.4 Develop the Cultural and Historic Assets of the Rio Hondo Watershed

- Building on work by RMC, complete survey to fully identify and assess the cultural and historic resources in the watershed.
- Develop a watershed recreation and education program centered on the rich historic legacy of the Rio Hondo
- Incorporate cultural and historic programs in watershed interpretive centers.
- Create a signage program featuring cultural and historic landmarks of the watershed
- Provide signage on trails marking nearby cultural and historic landmarks

3.4.5 Coordinate Recreational Programming to Reinforce Other Goals and Objectives

- Provide diverse recreational opportunities (horseback riding, environmental education, fishing, nature walks, clean-up activities, etc.) and engages individuals, interest groups, school groups and families with the Rio Hondo and the watershed.
- Provide programming, site design and signage to increase public awareness about riparian systems and engender stewardship of the land.
- Encourage Parks and Recreation Departments to incorporate community gardens and pocket parks, demonstration and restoration projects
- Educate public about catch and release fishing

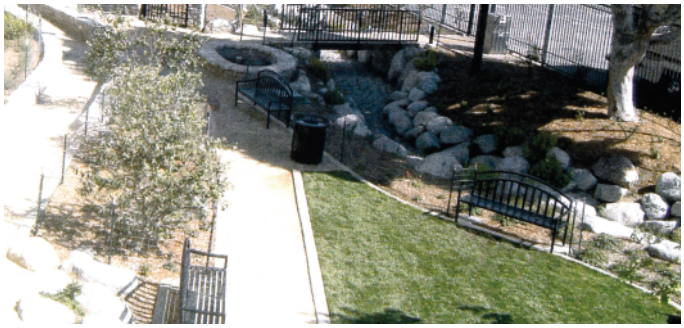
3.4.6 Clearly Identify Recreation Destinations Adjacent To Trails and Other Watershed Corridors

- Provide site signage and design details to orient visitors throughout the watershed
- Provide interpretive opportunities, including informative signage (explaining topics such as natural history, historic landscapes, fire, habitat, stewardship, pollution, hydrology, water supply, etc.) which are integrated with recreational facilities

Success Indicators / Performance Criteria

- Increased park land, especially in park-poor communities
- Ability for every neighborhood to have access to park and recreational facilities
- Increased miles of trails
- Interconnected trail network, making it possible for commuters to use bike trails safely to/from work for example
- Increased partnerships that result in more creative recreational programs and funding
- Compile database of all cultural and historic resources, continually updated.

Bimini Slough Ecology Park



Four Images of Stream Daylighting
(Courtesy of Rivers and Mountains Conservancy)

Case Study 4:

The Bresee–Bimini Slough Ecology Park

City of Los Angeles, California

A "Natural" Water Treatment Solution

Bresee-Bimini Slough Ecology Park was financed by the Bresee Foundation along with a new community center in Koreatown to offer local youth a safe place for after-school activities.

The Bresee- Bimini Slough Ecology Park was designed by the non-profit North East Trees to provide space for play, reflection, and group gatherings while also cleansing stormwater runoff through a biofiltration swale running through the site. The project located adjacent to the community center also involves a street closure; a one-block stretch of 2nd Street is being closed to vehicular traffic for the creation of this park. The project is a unique example where a city-owned street right-of-way was deeded over to a private foundation on the condition that it be developed and maintained solely as a public park.

The park development has achieved multiple purposes: 1) public community open space in a park poor urban neighborhood, 2) demonstration of a water quality bio-swale as a focal park element and other sustainable concepts, 3) environmental education and 4) improved pedestrian circulation and traffic-calming.

Several sustainable elements have been incorporated into the park design including a state-of-the-art drip irrigation system, a native/low flow water usage plant palette, recycled broken concrete, permeable surfaces, a 180 foot bio-filtration vegetated swale, and a trash interceptor. The environmentally friendly irrigation and indigenous vegetation minimizes water usage. The bio-swale filters storm water runoff from a 5.85 acre local drainage area, which eliminates some of the gross pollutants and toxins from the water that flows out to the ocean, addressing the Total Maximum Daily Load (TMDL) for trash established for the Ballona Creek watershed, where the park is situated.

The structural design of the swale needed to ensure permeability and swale alignment eliminates the need for concrete retaining walls. The swale banks are retained by the placement of boulders.

The Bresee–Bimini Slough Ecology Park (continued)

This park, equipped with two custom designed interpretive signs supports an environmental education agenda to highlight the multiple benefits of drip irrigation and native planting and ecology. Together with the design elements and program, the park is meant to inspire environmentally-conscious design and construction by example. Many of the concepts such as drip irrigation, native/low water usage landscaping, permeable paving and bio-filtration can be implemented on various scales from commercial to residential. By promoting these concepts and illustrating their regional implications and cost-effectiveness this park educates homeowners and builders to incorporate these types of elements into existing or future landscape improvement projects.

What is a bio-swale and how does it work?

A major, visually pleasing component of the park is a stream-like feature surrounded by a landscape of boulders. This streambed is called a "bio-swale" because it performs an important ecological function. The bio-swale is lined with an open lattice of cement bricks and plantings of indigenous plants in the open spaces. At the west end of the swale, a storm drain from the street opens into it.

During rainstorms, storm water from the street drainage system pours out and passes through a metal strainer to capture large pieces of trash before the water flows into the swale. The open spaces of the cement lattice in the swale allow water to soak into the ground and the plants act as a natural filtration system before the water flows back into the city storm drain system at the east end of the swale.

Sources:

North East Trees (http://northeasttrees.org); *The Bresee-Bimini Slough Ecology Park.*

park2parkLA (www.park2parkla.com), *E-Park for LA: Hi-Tech Enjoyment and Low-Tech Environmental Solutions.*

Case Study 5: Cheonggyecheon River Restoration Project

Seoul, South Korea

"Daylighting" A River

The largest urban renewal project in Korean history and possibly the largest daylighting project in the world, the Cheonggyecheon Restoration Project in Seoul, began in 2003 and is expected to be completed in 2006. The Cheonggyecheon is a stream that flowed through the central part of Seoul until it was covered four decades ago by a concrete roadway and later an elevated expressway. The $307 million project has been described as the equivalent of rearranging downtown Manhattan so a river could flow through the middle. Restoration of the river will enable residents of Seoul to enjoy a stream that for centuries had figured prominently in the life of the capital until 20th century urbanization pressures literally forced it underground.

According to the plan, the city will take down the six-lane highway, remove the asphalt, decontaminate the river, and create a park and wide pedestrian corridor on the shores of the river in its place. As many as 21 bridges, each reflecting the character of their neighborhoods, will be built over the 6 kilometer stream. A Bus Rapid Transit Line will replace the 120,000 cars that use the corridor daily.

Landscaped revetments will create curves in the stream and irregularities in the streambed for fish habitat. In addition, "swamps" along the lower reaches will also provide wildlife habitat.

The river restoration is seen as the catalyst for an even larger economic redevelopment strategy in which the Seoul Metropolitan Government is striving to transform Seoul into a high-tech, environmental friendly city that will attract both locals and tourists.

Excerpted from:

Car Busters-Monthly Bulletin Issue 46 (from ITDP Sustainable Transport E-Update) *Seoul to Raze Elevated Highway, Revitalize City Centre*, May 2003.

Katherine Redding, SFGate.com, *Water Warriors – United Creek Council Quietly Fights to Bring Streams to Light,* April 4, 2003.

Korea Now, *Seoul Unveils Master Plan to Revive Derelict Stream*, February 2003.
Tai Sik Lee, Civil Engineering Magazine, *Buried Treasure*, December 2003

3.5 Incorporate Public Health and Safety Priorities

Much of the current watershed infrastructure has been shaped by sustained efforts over past decades to ensure public health and safety. This includes the concrete channelization of the Rio Hondo for flood control purposes, and the elimination of wetlands as a breeding ground for mosquitoes. These past strategies were largely successful in their single purpose aims but at the cost of undermining the health of the watershed. New, multi-objective approaches to flood and vector control are proposed as a way of restoring the health of the watershed while still maintaining and enhancing the health and safety of the community.

GOAL: *Ensure that public health and safety are integrated into all aspects of watershed enhancement.*

Strategies and Potential Actions

3.5.1 Create a Safe and Secure Environment Along the River and Other Open Spaces

Public safety is of paramount importance to the current and future anticipated use of the Rio Hondo. New parks, trails, and other physical improvements along the river and in other watershed venues will only be fully utilized by the public if they are perceived as safe and secure environments. Establishing a watershed-wide constituency for the Rio Hondo requires that people have the opportunity to enjoy its benefits without fear of crime or other physical hazards.

- Develop a cross-jurisdictional safety and maintenance program
- Establish public safety measures to prevent crime along the river and its tributaries
- Request regular patrols by uniformed officers and trained citizen watch groups to increase both real and perceived safety

- Provide security lighting where appropriate (many sensitive species do not like night- lighting) at trailheads and recreational areas.
- Ensure that adequate signage is in place

3.5.2 Initiate Municipal Stormwater Infrastructure Age and Capacity Evaluations

Undertake a comprehensive evaluation of the existing storm drainage system. Convey the results to the watershed consortium to use in baseline evaluations.

3.5.3 Establish Consistent Stream Setback Ordinances

Some municipalities, particularly those with naturalized or restored stream channels, have implemented stream setback ordinances to protect flowing water[5]. Communities could identify streams to be protected and work within the watershed consortium to establish consistent language for protection.

3.5.4 Modify Municipal Activities to Minimize Pollutants in Stormwater

Municipal maintenance operations, oftentimes the ones that provide stewardship for watersheds, have a direct impact on the quality of stormwater leaving their sites. It is important for these corporation yards to 'practice-what-they-preach' and to potentially be models to prove the feasibility to the community of fleet and maintenance operation to be done in a new way. It is recommended that these municipal facilities establish a program for self evaluation, improvement, and ultimately promotion of BMPs.

- Identify and select appropriate BMPs for all fixed facilities and field programs
- Eliminate sources of stormwater pollutants at all facilities
- Implement long-term maintenance programs for BMPs once they are implemented
- Evaluate effectiveness of BMPs through site inspections, monitoring, record-keeping and BMP modifications

[5] City Of Oakland Stream Setback Ordinance

3.5.5 Update Land Use, Zoning and Building Codes To Improve Water Quality

- Identify needed changes in land use, zoning codes, and development standards and ways to implement local enforcement of these codes. For reference see:http://www.epa.gov/owow/nps/ordinance/index.htm
- Explore ways to mitigate impacts on the watershed related to population growth.
- Ensure that the design and construction of all new developments (project sites, parking lots, streets, buildings, etc.) reflect and apply water quality best management practices.

3.5.6 Pursue Legislation to Encourage Water Quality Improvements by Cities

- Pursue legislation to encourage cities to implement good faith water quality improvement efforts and curtail the current litigious legal environment surrounding water quality improvement.
- Pursue one time establishment of *all* TMDL standards for the Rio Hondo watershed rather than the current staged implementation of TMDL standards for individual pollutants. The current system creates an atmosphere of uncertainty under which planning objectives are constantly changing.
- Establish a more rational, transparent process based on an agreed set of graduated steps and goals that will reward rather than penalize such efforts.

3.5.7 Incorporate Vector Control Into All Watershed Projects

It is critical that mosquito and vector control agencies be consulted in the planning, design, construction, and ongoing maintenance of watershed projects, particularly where the project has the potential to result in new vector breeding and diseases transmission. There is a significant body of knowledge regarding innovative approaches to designing and managing constructed wetlands for vector abatement that could be valuable in future watershed projects. If wetland and open space projects are poorly designed with regard to mosquito and vector control, the potential exists for significant social and financial impacts. This is now even more important given that West Nile Virus is expected in the near future to migrate into the San Gabriel Valley

- Reduce vector breeding potential and encourage public education of vector-borne diseases and precautions
- Coordinate planning at the watershed-wide level and the project level with local mosquito and vector control agencies
- Ensure that vector control parameters are fully integrated into the design of wetlands, parks, and other open space projects.
- Utilize appropriate construction methods to guard against mosquito breeding and other vectors
- Ensure that sufficient funding is established for ongoing continued maintenance to mitigate vector breeding.

Success Indicators / Performance Measures

- Implementation of TMDLs and concurrent reductions in all listed pollutants, including trash and bacteria levels, nitrogen, copper, zinc and certain persistent pesticides (Chlordane and DDT) within impaired reaches of the watershed.
- Removal of waterbodies from 303(d) list as a result of clean up efforts.
- Restoration of aquatic and riparian wildlife and habitat to streams
- Experience safe body contact with water
- Maintain working relationship between regulators and permittees
- Identification and elimination of sources of pollution based on data collected by water quality monitoring program
- On-going participation by stakeholders in watershed organization
- On-going participation by technical experts to guide the process

3.6 Ensure Continued Flood Protection And Safety

The design and implementation of all watershed projects must fully integrate the essential overriding goal of flood protection. It is a fundamental requirement of a multi-objective watershed planning process in an urban environment. Although there is often a desire to provide more public access to the river, this must be balanced with the need to keep people away from the flood control channel, especially during and following storm events.

In the Rio Hondo watershed the existing impervious surfaces of urbanization do require flood protection. Still there is a general understanding and interest by stakeholders that flood protection can be modified to integrate natural processes and achieve multiple goals while still providing protection to the public. There are examples of this approach where BMPs have been initiated, encroachment on the flood channel reduced, and riparian habitat increased. (Please see inset on Napa River.) These strategies also echo the Guiding Principles from *Common Ground from the Mountains to the Sea, the San Gabriel and Los Angeles Rivers Watershed and Open Space Plan.*

GOAL: *Maintain current minimum flood protection levels and develop new flood protection strategies to meet the multiple goals required for watershed improvement.*

A few proposed Best Management Practices involve concrete removal on tributaries of the Rio Hondo. While greening the river corridors, existing flood protection needs to be maintained. Appropriate hydrologic and hydraulic studies would be necessary to ensure that flood hazards would be minimized and that current design criteria are met. Future projects should improve flood protection where feasible. Where excess capacity can be identified, or generated through implementation of BMPs, then the feasibility of floodplain restoration should be assessed.

3.6.1 Understand and Maintain Existing Flood Protection Capacities

The hydrology of flood control is complex science. Numerous evaluations, calculations, and modeling have been done to build the existing flood control system. Knowing the background on the existing system will help identify constraints and opportunities within the hydrologic system. In some cases where excess flood control

capacity is identified, then candidate sites for habitat enhancement or recreation might be identified. Public education, warning signs, and other safeguards must be integrated into any plans to open up the river to greater public access.

- Promote flood safety awareness, especially the dangers created by fast moving runoff in flood control channels
- Install and maintain fencing, especially at known danger spots.
- Ensure that warning signs are installed and maintained at regular intervals along the river and its tributaries
- Sign explaining how urban development creates more flood waters and what you can do about it

3.6.2 Reduce Runoff in the Watershed to Generate Flood Control Capacity

Reduction of impervious surfaces will work to reduce peak flows throughout the watershed to minimize flood hazards. This in combination with strategically placed retention basins above permeable soils will reduce peak flows upon implementation. Planners should look for parks, schools, open spaces, or parking areas above these permeable soils to begin implementing a network of storm water retention basins. As projects are developed access to the water must be carefully evaluated to ensure that liability has not increased.

3.6.3 Daylight Storm Drains and Restore Urban Streams

The existing storm drain system can also integrate natural processes when municipalities or other organizations daylight creeks from their concrete culvert enclosures. The key is to properly configure the channel slope and allow for revegetation. When done over permeable soils there is the added benefit of aquifer recharge in the new channel.

3.6.4 Improve Flood Protection Using Natural Processes

When modifying existing flood control facilities use of non-structural flood control elements is encouraged, where feasible. Often the modified design must provide equal or greater strength of the structural options, but must do it in such a way as to be supportive of natural habitats and to be visually pleasing. Sometimes the modified

flood control design must incorporate or protect habitat for species of specific concern. For example certain aquatic species require naturalized low-flow streambeds.

Natural sedimentation in the streams has been highly modified. In the upper reaches sedimentation may be higher than normal as a result of poorly constructed roads and forest practices. In lower reaches, particularly below dams, sedimentation is typically lower as a result of pooling. In these lower reaches water with little sediment is called hungry water, because it wants to pick up the sediment load that it is missing. In a concrete lined channel this is not an issue, but in a restored creek bed it could cause erosion as it picks up it's natural sediment load. Sluicing and maintenance operations should incorporate sedimentation demand or reduction where appropriate.

3.6.5 Model for Decreased Flood Volumes

As BMPs for water retention and aquifer recharge are implemented flood volumes will begin to decrease and hydrographs will come closer to resembling natural environments. As this occurs more areas of the channel will begin to have excess capacity. Investigate opportunities to enhance floodplains where the channel has excess capacity by modeling how reductions in peak volumes translate into previously inundated areas. This may be done by considering varying degrees of implementation of BMPs, such as early phases (low BMP implementation), developing phases (showing increased or moderate benefits of BMP implementation), and advanced phases (showing benefits of maximum implementation of BMPs).

3.6.6 Coordinate Maintenance of the Flood Protection System with Habitat Needs

Vegetation in the flood control channel is viewed completely differently depending on a persons perspective. For flood control it is traditionally bad in that it slows down and encumbers floodwaters. Trees break, floating logs take out bridges, etc. For habitat on the other hand vegetation is a requirement. Somewhere in the middle are maintenance crews clearing the stream channel while protecting habitat.

3.6.7 Improve Multi-Use Characteristics and the Visual Aesthetics of Flood Control Elements

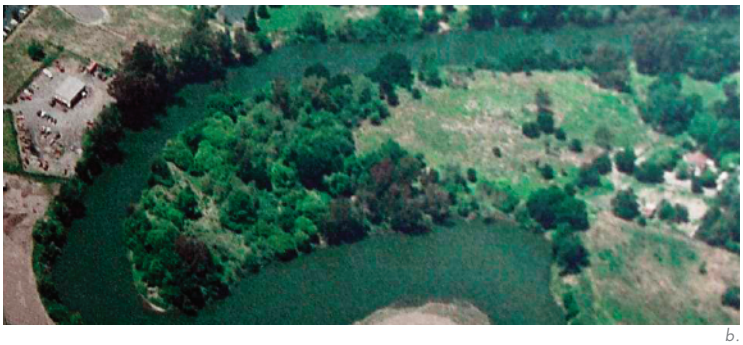
In proposed projects foster multi-purpose flood control infrastructure to accommodate recreation, trails, open space and habitat. Incorporate visual consideration in adapting single purpose flood control channels into multi-purpose environments for people and animals.

Success Indicators

- Best Management Practices (BMPs) are implemented throughout the watershed
- Reduction in the overall percentage (and actual acres) of impervious surfaces
- Retention basins on permeable soils are preserving open space and providing recreation
- Hydrographs for new flow conditions migrate closer to that of a natural watershed
- Peak flows are measurably reduced and flood risks are quantifiably reduced
- Urban streams are restored – measured in miles
- Floodplains and riparian habitat are restored where feasible – measured in acres
- Flood safety and educational materials reach as many households as possible – measured in pieces of literature distributed or website hits
- Flood safety programs, including the dangers of floodways, reach as many people in as many languages as possible – measured in number of people in attendance

Napa "Living" River Project

a.



b.

a. Napa River Oxbo
b. Napa River Boats

Case Study 6: The Napa River Flood Management Plan

Napa County, California

Blending Engineering and Ecology

The Napa River Flood Management Plan, designed by a unique Community Coalition, is a creative solution, to an age-old problem: How to provide flood protection and watershed management to the Napa River Valley while meeting environmental restoration and economic revitalization goals? The Community Coalition's plan was built on a set of "living river" principles, developed and refined by an unprecedented coalition of political and community leaders, private industry, natural resource agencies, non-profit groups, local governments and private citizens.

The Napa River Watershed historically supported a dense riparian forest, significant wetland habitat and spawning areas for fish such as salmon and steelhead. The pressures of urbanization, agriculture, and grazing have degraded the watershed's habitats and drastically increased the rates of erosion and sedimentation. Since 1800, an estimated 6,500 acres of historical valley floor wetlands have been drained or filled, 19,700 acres of the watershed are now under hardened pavement or rooftops and another 26,000 acres have been developed to intensive cultivated agriculture. At the same time, much of the river system has been altered by straightening channels, hardening banks, changing the flow, and constructing levees. These alterations made the natural drainage system insufficient to prevent extensive flooding in the area. Since 1862, more than 27 major floods have plagued Napa Valley, resulting in significant loss of life and property. The 1995 flood damaged 277 businesses and residences at a cost of over $100 million.

In response the U.S. Army Corp of Engineers offered a new plan in 1995 to address the flood control problem. The plan's traditional approach –enlarging the channel and constraining the river within the channel – was met with an underwhelming response in Napa. The Community Coalition came together in 1996, and using the Army Corp as a resource, began the extensive process of formulating an alternative flood control approach. Thousands of hours of meetings later, a "living river" design achieved consensus. Less than one year later, in March 1998, a proposal to add a half-cent to the Napa County sales tax to fund the local share of this Flood Project was put before the voters. A two-thirds majority was required to approve the tax increase. More than 27,000 voters cast a ballot on that election day, and Measure A passed with just 308 votes to spare.

Major objectives of the "Living River" design include reconnecting the River to its historic flood plain; maintaining the natural slope and width of the River; allowing the River to meander as much as possible; retaining natural channel features like mud flats, shallows and sandbars; and supporting a continuous fish and riparian corridor along the River.

The measures designed to provide 100-year flood protection include some traditional

approaches and many innovative concepts. Old dikes have been breached to restore tidal marshlands; bridges are being replaced to remove obstacles to water flow; riverbank terracing is creating more room for large volumes of water; a new dry bypass channel will provide a shortcut for the River through the slow moving Oxbox; new dikes, levees and floodwalls will be built; bank stabilization will be used in specific areas; and detention basins and pump stations will accommodate runoff behind the floodwalls.

The project is viewed as having three inter-locking elements:
Increased public safety through flood protection
Watershed stewardship through environmental remediation and restoration
Enhanced prosperity through the reduction of insurances costs and flood risk, and stimulation of economic development

The end result is a Living River that can sustain migrating fish and wildlife and a system that will help protect all County residents from damages caused by regular flooding.

Excerpted from:

Clean Water Action Plan (www.cleanwater.gov), *Watershed Success Stories: Applying the Principles and Spirit of the Clean Water Action Plan.*

Napa County Flood Control and Water Conservation District, *The Napa River Flood Protection Project – Progress and Plan Summary 2004*

U.S Army Corp of Engineers and Napa County Flood Control and Water Conservation District, *A Citizen's Guide to the City of Napa, Napa River, and Napa Creek Flood Protection Project.*

3.7 DEVELOP PRIORITY PROJECTS THAT ADDRESS MULTIPLE GOALS SIMULTANEOUSLY

In the preceding sections six goals have been addressed in detail with strategies and objectives for achieving each of them. To review, those goals include the following:

1. Improve Water Quality and Supply
2. More Multi-use Open Space
3. Improve and Connect Habitats
4. More Recreation Facilities
5. Continued Concern for Public Health and Safety
6. New Flood Protection Strategies

The seventh goal is intended to **benefit** the Rio Hondo Watershed by leveraging the efforts and financing of all the participating agencies, individuals, and organizations to achieve multiple benefits with within each project. The consortium of interested entities, the willingness to address problems on multiple fronts, the acknowledgment of complexity, and the long-term commitment to resolving the issues will all position the watershed consortium favorably before funding entities and enable rapid progress towards these goals. For these reasons the ninth goal is brought forward to encourage imaginative and integrative projects that address multiple issues.

GOAL: *Develop priority projects that address multiple goals simultaneously*

An initial set of projects have been brought forward by many of the participating entities for consideration in this watershed management plan. They are described in the following chapter, and they represent an important first step in achieving this goal. A sustained focus on achieving multiple goals in all projects is the key paradigm shift necessary to enable rapid progress towards this noble effort of restoring the Rio Hondo Watershed.